

What is claimed is:

1. A method for processing seismic data comprising:

a) acquiring seismic data with an initial velocity field and an interpreted horizon;

b) performing prestack imaging on said seismic data;

c) estimating a residual depth difference to compute a residual depth map for said interpreted horizon;

d) back projecting residual depth difference map to determine slowness perturbation;

e) converting input velocity field to slowness to produce new slowness volume; and

f) repeating steps b) through e) until slowness perturbation has reached a predetermined threshold.

2. The method of claim 1 further comprising partitioning said velocity field into partitions with padding.

3. The method of claim 1 further comprising partitioning said velocity field into partitions with a padding distance of at least half the offset of an input seismic gather.

4. A digital computer programmed to utilize seismic data traces obtained over a region of the earth's subsurface to perform a process comprising:

a) acquiring seismic data with an initial velocity field and an interpreted horizon;

b) performing prestack imaging on said seismic data;

- c) estimating a residual depth difference to compute a residual depth map for said interpreted horizon;
- d) back projecting residual depth difference map to determine slowness perturbation;
- e) converting input velocity field to slowness to produce new slowness volume; and
- 5 f) repeating steps b) through e) until slowness perturbation has reached a predetermined threshold.

5. The digital computer of claim 4 further programmed to perform a process for partitioning said velocity field into partitions.

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6. The digital computer of claim 4 further programmed to perform a process for partitioning said velocity field into partitions with a padding distance of at least half the offset of an input seismic gather.

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7. A system for processing seismic data obtained over a region of the earth's subsurface comprising:

- a) acquiring seismic data with an initial velocity field and an interpreted horizon;
- b) performing prestack imaging on said seismic data;
- c) estimating a residual depth difference to compute a residual depth map for said
- 20 interpreted horizon;
- d) back projecting residual depth difference map to determine slowness perturbation;
- e) converting input velocity field to slowness to produce new slowness volume; and

f) repeating steps b) through e) until slowness perturbation has reached a predetermined threshold.

5 8. The system of claim 7 further comprising a process for partitioning said velocity field into partitions.

9. The system of claim 7 further comprising a process for partitioning said velocity field into partitions with a padding distance of at least half the offset of an input seismic gather.